



Active SPOI User Manual V1.0

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Revision History

Date	Version	Description
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2. ABOUT THIS GUIDE

This purpose of this document is to explain installation, setup, and operation of the *Active SPOI DAS interface Tray* by SYM Technology, Inc. It is intended to provide all the necessary information and guidance needed to use the system.

The installation guidelines are of a general nature due to the wide variety of installation-specific requirements within individual sites. SYM Technology prides itself on ensuring that installation is successful. Please contact SYM Technology directly if additional installation information is required (see section 3.3 for contact information).

2.1. WHO SHOULD USE THIS GUIDE?

This guide is intended for use by trained telecommunication professionals responsible for base station (BTS)/Distributed Antenna Systems (DAS) performance, including:

- RF Performance Engineers
- Operations Engineers
- BTS & DAS Site Technicians

SYM Technology assumes installation personnel will have an advanced understanding of RF engineering principles and typical BTS and DAS site architecture and installation procedures.

It is the operator's responsibility to ensure that this equipment is properly installed and operated within SYM Technology operating specifications in order to obtain proper performance of the Active SPOI and to comply with regulatory requirements.



Warning: Failure to follow the installation and configuration recommendations contained herein may result in service interruptions and/or damage to the unit.



Warning: This equipment may be installed in close proximity to cables, connectors, or components carrying high RF power. Installation and operation must be completed by qualified personnel.

3. GENERAL

3.1. WARNINGS, CAUTIONS, AND SAFETY

There are several simple guidelines to operating the Active SPOI properly and safely.

- Avoid exposing the Active SPOI to extreme temperatures, either hot or cold. The Active SPOI is for indoor use only.
- Keep the unit in a clean, well-ventilated, and dust-free location.
- Avoid exposing the Active SPOI to rain or liquid spills. If the Active SPOI gets wet, immediately turn off the power and dry the unit completely.
- Treat the Active SPOI with care. Avoid dropping, throwing, or sitting on it. Rough treatment may damage the unit and void the warranty.
- Do not attempt to disassemble your unit. If the warranty seal has been broken, the warranty is no longer valid.
- Any changes or modifications to your unit not expressly approved in this document could void your warranty.

3.2. HUMAN EXPOSURE TO RF RADIATION

This system complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This system may cause harmful interference.

(2) This system must accept any interference received, including interference that may cause undesirable operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note !

This system has been tested and found to comply with the limits for a Class A digital device, pursuant to the FCC Rules.

3.3. MANUFACTURER'S LIMITED WARRANTY

SYM Technology Inc. ("SYM Technology") offers a limited warranty that the enclosed unit ("Product") will be free from defects in material or workmanship as follows:

ONE (1) YEAR LIMITED WARRANTY: For a period of one (1) year from the date of original purchase, SYM Technology will, at its option, either repair or replace a defective Product (with new or rebuilt parts/replacement).

LIMITED WARRANTY ON REPAIRED/REPLACED PRODUCTS: After SYM Technology repairs or replaces the Product, the repaired or replaced Product shall be covered by warranty for the remaining time of the original warranty period or for ninety (90) days from the date of repair, whichever is longer. Repair or replacement may include the use of functionally equivalent reconditioned units. Replaced faulty parts or components will become the property of SYM Technology.

This limited warranty does not cover and is void with respect to the following: (i) Products which have been improperly installed, maintained, modified, or repaired; (ii) Products which have been subject to outdoor use, misuse, physical damage, abnormal use or operation, improper handling or storage, exposure to fire, water, excessive moisture, or extreme temperature; (iii) Products operated outside published maximum ratings; (iv) Products on which warranty seals or Product serial numbers have been removed, broken, or altered; (v) cost of installation, set up, removal, or reinstallation; (vi) signal reception problems or network problems (unless caused by defect in material or workmanship); (vii) damage as a result of fire, flood, power surge, lightening, acts of God, or other acts which are not the fault of SYM Technology and which the Product is not specified to tolerate; (viii) any Products which have been opened, modified, or repaired by anyone other than SYM Technology or a SYM Technology authorized service center.

REPAIR OR REPLACEMENT, AS HEREINABOVE PROVIDED, IS YOUR SOLE AND EXCLUSIVE REMEDY FOR BREACH OF THE LIMITED WARRANTY. SYM Technology SHALL HAVE NO LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF SALES, OR LOSS OF USE OF THE PRODUCT. SYM Technology MAKES NO OTHER EXPRESS WARRANTY, EITHER WRITTEN OR ORAL, WITH RESPECT TO THE PRODUCTS. THE DURATION OF IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IS LIMITED TO THE DURATION OF THIS EXPRESS WARRANTY.

SYM Technology Inc.

Attention: Customer Service

Phone: (626) 394-6630, Email: support@symtechnology.com

4. PRODUCT OVERVIEW

4.1. INTRODUCTION

The Active SPOI is an innovative approach to remotely managing the power levels of DAS systems. The modular design allows the user to mix and match cards with different frequencies for complete customization. A fully loaded chassis with all eight line cards installed will support four sectors with a MIMO configuration for one frequency band. The innovative graphical user interface (GUI) design is very intuitive and was developed to be so simple to reduce training requirements and ease the use of operation. This unit also handles both high and low power radios, up to 48 dBm on High Power Mode and 38 dBm on Low Power mode with insertion loss of 13.5 dB and 3.5 dB respectively. In case of a power failure, the active SPOI bypasses to the safe mode to ensure continuous service.

Up to 15 shelves (units) can be daisy chained together in a Host-Remote configuration. The design has been engineered to make remote access as user friendly as possible with a single connection to the Host unit allowing the user to control all of the Remote units from the single connection.

Users have 24/7 access to the system once it is properly installed. Multiple personnel can access the Active SPOI simply by using an Internet connection to log on to the Web-based GUI. Users can view and adjust power levels, modify configuration settings, and set alarm threshold levels as well as many other actions found in this manual.

The Active SPOI monitors the downlink input power changes and displays the values in a user-friendly graphical chart. The power level is measured hourly and recorded in the log file where the results are analyzed and displayed for one year's worth of data providing a useful tool for trending and analysis reporting. This product has been engineered to integrate seamlessly with the SYM iSpectrum which provides a live spectral view of the attenuation (insertion loss) changes made in the active SPOI.

The Active SPOI sends out SNMP V2c and V3 based alarm notifications. There are 7 alarm parameters including DL input overpower, UL input overpower, DL input low power, LNA, FAN, PLL, and Temperature. The alarming feature generates alarm reports over a user-specified time period based on alarm counts.

More information on these features as well as all information necessary to properly use the Active SPOI will be described in the following chapters. The steps required to install and configure the Active SPOI will be described in detail. However if information or assistance is required, please contact:

SYM Technology, Inc.

Attention: Customer Service

Phone: (626) 394-6630, Email: support@symtechnology.com

4.2. PARTS LIST

No	Item	Description	Qty.
1	SP-MFC	Main Frame Chassis and Controller	1
2	DC Power Cable	-48VDC Power Cable 6 ft	1
3	Ethernet Cable (RJ-45)	Straight Cable 3 ft	1
4	RF Card*	RF Interface Card	8

*RF Card: RF Cards are separately packed.

Table 4.2a. Part List

PART NO.	RF CARD DESCRIPTION	DL FREQ.	UL FREQ.
S700C	700MHZ UPPER C BAND	746-757	776-787
S850	850MHZ CELLULAR BAND	869-894	824-849
S1900	1900MHZ PCS BAND	1930-1995	1850-1915
S2100	2100/1700MHZ AWS BAND	2110-2155	1710-1755
S800S	800MHZ SMR BAND (SPRINT)	862-869	817-824
S800N	800MHZ SMR BAND	851-869	806-824
S2600	2600MHZ BRS BAND	2496-2690	2496-2690
S700A	700MHZ LOWER ABC BAND	728-746	698-716

Table 4.2b. RF Card List

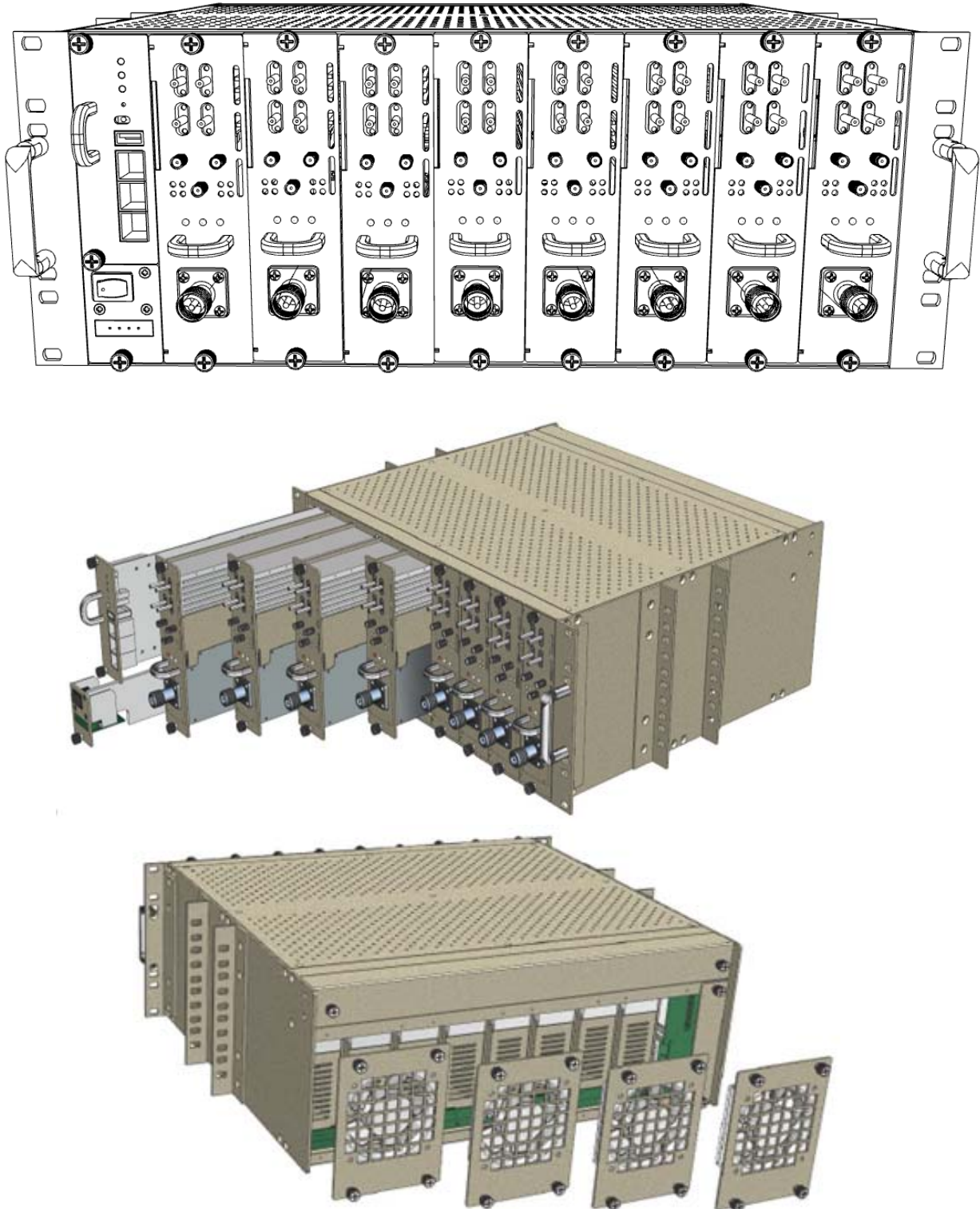


Figure 4.2a. Active SPOI Views

4.3. ACTIVE SPOI AT A GLANCE

The Active SPOI is a system designed to provide complete RF power control with advanced active features for manual or automatic power level adjustments. The unit consists of a chassis with a control module and up to 8 plug and play, hot swappable line cards that can be mix and matched between line cards with different frequencies.

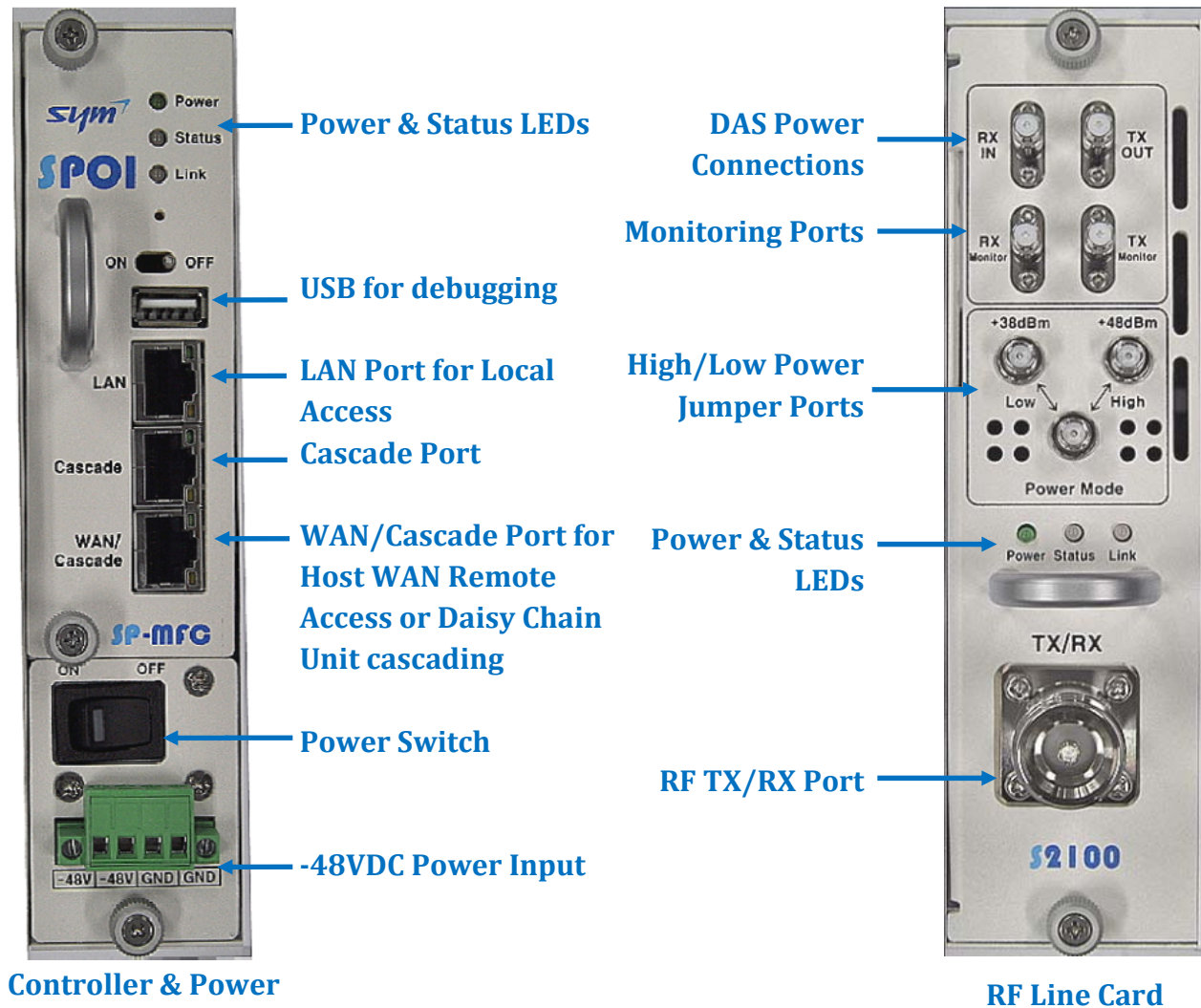


Figure 4.3a. Active SPOI Controller/Power and RF Line Card External View

5. INSTALLATION

5.1. MOUNTING

The Active SPOI is a 19-inch rack mountable unit. It can be mounted into a 2-post rack utilizing faceplate mounting. The faceplate with side-securing elements can be placed at the front, rear, or both ends of the unit.

a. 2-Post Mounting

When the Active SPOI is installed in a 2-post rack system, a 19-inch supporting shelf will not be required. A detachable side-mounting bracket can be mounted at the middle of the Active SPOI as shown below. Mounting brackets at the middle of the unit will allow for 2-post rack mounting.

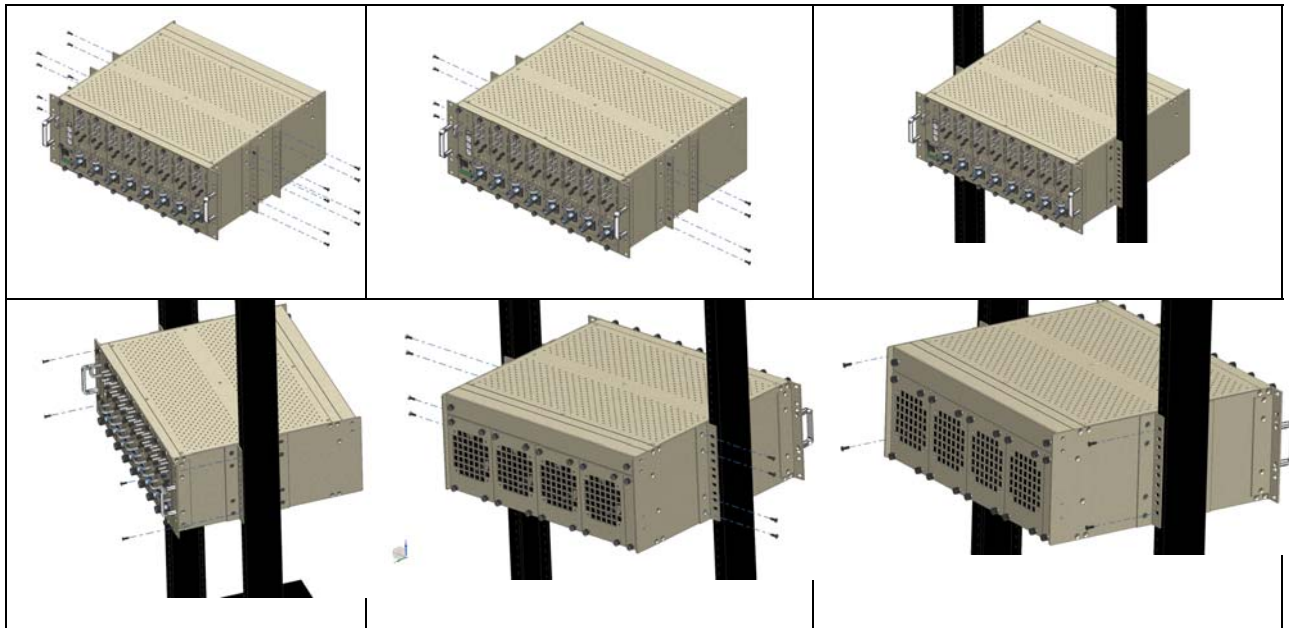


Figure 5.1a. Active SPOI Mounting on 2-Post Rack

5.2. CONTROLLER AND RF LINE CARD CONNECTIONS

5.2.1. Controller: Host/Daisy Chain Settings

The Daisy chain mode is selectable through the local web GUI connection only. In case of remote connection, the SET button won't be displayed in order to prevent changing its mode mistakenly. The Node information is configured on the main controller unit (MCU) by selecting either Host or Remote (1 to 14) for the daisy chain connections.

Host Unit Mode: This designates the unit as the Host Controller and all Remote units that are connected to the host will be controlled via the Host GUI, which allows for a single point of interface and ease of use. By default, all units are set as Host.

Host Controller is assigned the IP address of: 192.168.169.100.

Node Information

Daisy Chain Mode :	Host	SET
ID (Cascade Code) :		SET
Serial Number :	SPMFC01001	
SW Version :	1.0.1	
Operating Time :	0 Day 5 Hours 19 Minutes 1 Second	
System Log :	GET	

Remote Unit Mode: This designates the unit to the Remote Controller (1 to 14). The IP addresses are automatically assigned from 1 to 15 in the order of the daisy chain for easier operation and maintenance. (See Section 5.2.2)

Node Information

Daisy Chain Mode :	Host	SET
ID (Cascade Code) :		SET
Serial Number :	Remote 1	
SW Version :	Remote 2	
Operating Time :	Remote 3	
System Log :	Remote 4	
	Remote 5	
	Remote 6	
	Remote 7	
	Remote 8	
	Remote 9	
	Remote 10	
	Remote 11	
	Remote 12	
	Remote 13	
	Remote 14	

37 Seconds

Figure 5.2.1a. Controller Host/Remote Settings

5.2.2. Controller: Ethernet Connection

The Ethernet ports are located on the front panel of the main controller as shown in section 4.3.

LAN Ethernet Port (for laptop connection)

The Active SPOI can be configured locally with the built-in web-based graphical user interface (GUI). Using a standard Ethernet cable, connect your laptop to the “LAN” port on the Controller. The LAN connection is simple to set up. The LAN connection should be used for initial setup and whenever the operator is on location.

Before you connect your laptop to the LAN port, verify your laptop’s Local Area Connection setting. For more detailed information, please refer to Section 5.2.7 “Laptop Network Setting”.

After a proper connection is made, the red and green LEDs near the Active SPOI Ethernet connector will flash. The network hardware will determine the highest speed supported by both devices. With most PCs, the operating system will automatically establish the hardware and software network connection.

WAN-Cascade & Cascade Ports (for Daisy Chain Connection)

Mode	Daisy Chain IP address	Mode	Daisy Chain IP address
Remote 1	192.168.169.101	Remote 8	192.168.169.108
Remote 2	192.168.169.102	Remote 9	192.168.169.109
Remote 3	192.168.169.103	Remote 10	192.168.169.110
Remote 4	192.168.169.104	Remote 11	192.168.169.111
Remote 5	192.168.169.105	Remote 12	192.168.169.112
Remote 6	192.168.169.106	Remote 13	192.168.169.113
Remote 7	192.168.169.107	Remote 14	192.168.169.114

Table 5.2.2a. Remote Cascade IP Address Table

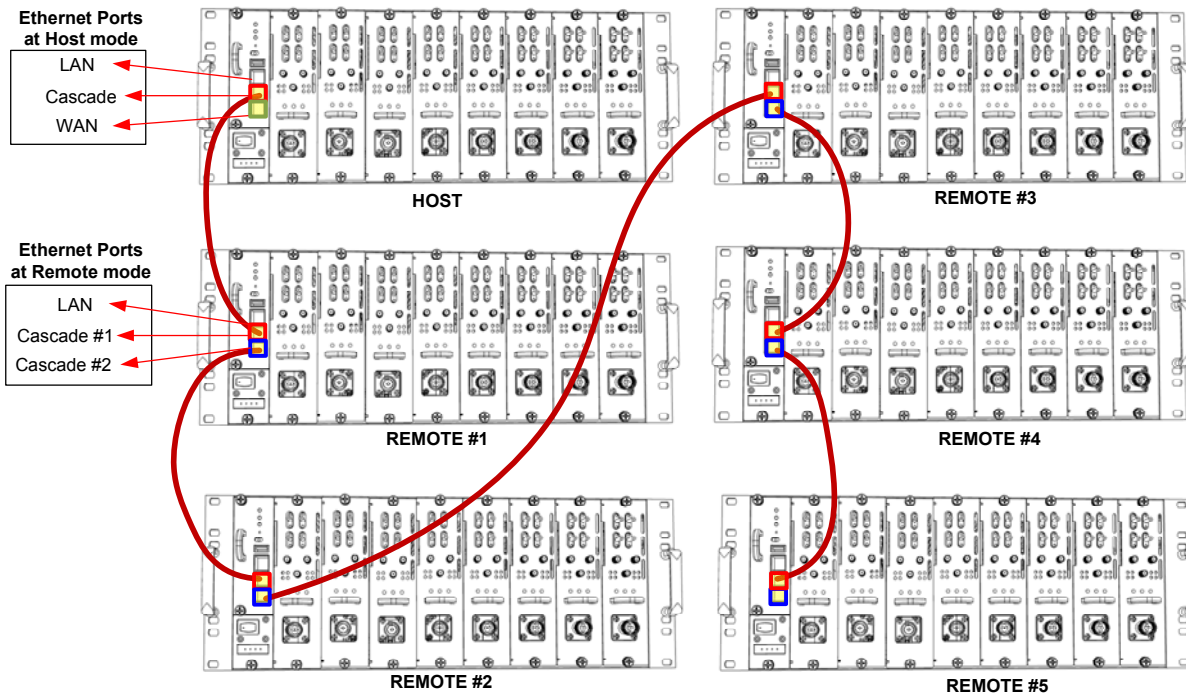


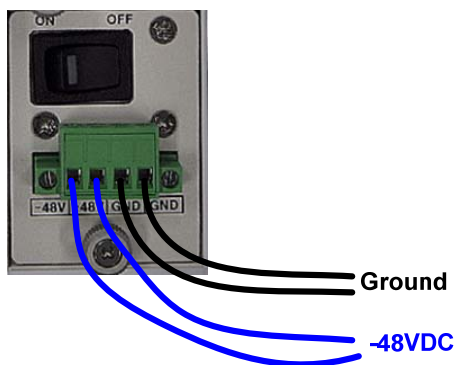
Figure 5.2.2a. Daisy Chain Connection example

5.2.3. -48VDC Input: Power Connection

The Active SPOI requires -48 VDC power.



WARNINGS: This unit uses dangerous voltages. Loss of life, severe personal injury, or property damage can occur if the instructions contained in this manual are not followed. It is compulsory to ground the unit before connecting power.



5.2.4. Line Card: RF Cable Connection

The Active SPOI needs to be installed between the BTS and the DAS head-end unit.

The RF input signal level should be within the normal operating range: up to +48dBm for the High Power Mode and up to +38dBm for the Low Power Mode. Connect the signal from the BTS to the TX/RX RF Power port, and connect to the DAS using the TX Out and RX In ports.

- BTS TX/RX Port: Mini-DIN (F)
- DAS TX OUT/RX IN Ports: QMA (F)
- Spectrum TX/RX Monitor Ports: QMA (F)

5.2.5. RF Line Card: Power Selection Mode

The user must determine if the Active SPOI will be operating in the High or Low power mode, and install the jumper (supplied) in the correct position. The High (H) and Low (L) power mode configurations are shown below in figure 5.2.5. There is no DIP or toggle switch to select power mode. Based on jumper cable connection and input signal power, the unit will determine its operating mode automatically.

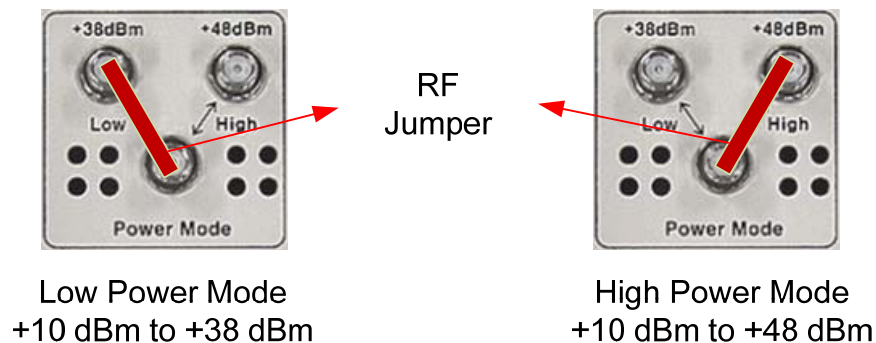


Figure 5.2.5 RF Jumper Cable connection for Low and High Power Mode

5.2.6. Line Card: Monitor Ports

The TX and RX Monitor ports can be used as spectrum monitoring ports. Both the downlink and uplink ports are available with a minimum insertion loss of 31dB (Low Power Mode)/41dB (High Power Mode) for downlink and 8dB for uplink. These ports are ideally engineered to operate seamlessly with the SYM iSpectrum, 24-port, virtual spectrum analyzer.

With the iSpectrum, it's a match made in heaven. You can watch live RF performance of your system via the iSpectrum, and the user can adjust the system attenuation (Insertion loss) remotely through the active SPOI without having to visit the site.

The iSpectrum link is integrated into the Active SPOI GUI, and with one click, the user will be redirected automatically from the Active SPOI to the iSpectrum RF view screen. For example, when a user changes the attenuation setting on the Active SPOI, with a click of a button, the user will be able to see the live RF signals to see how the attenuation change affects the signal in real-time. Please refer to the section 6.1.8 for more details regarding the iSpectrum connection.

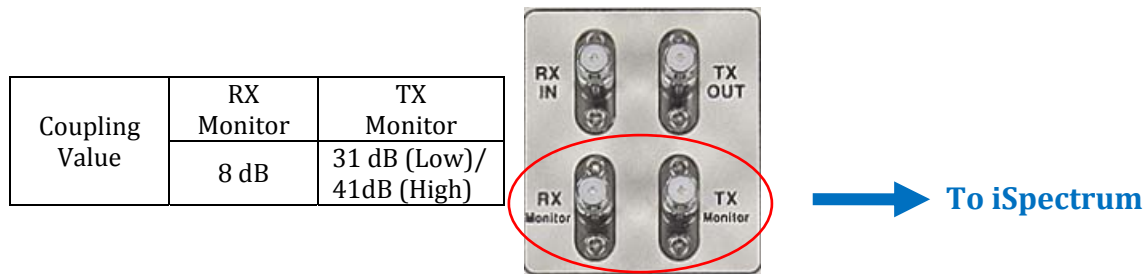


Figure 5.2.6. Active SPOI Monitoring Ports

5.2.7. Laptop Network Settings (PC)

Before using the Web GUI, make sure the Ethernet connection between the user's laptop (or PC) LAN port and the LAN port of the Active SPOI is established.

To begin network connection, proceed as follows:

- 1) Connect the Active SPOI LAN port to Laptop (or PC) using the Ethernet Cable (RJ-45).
- 2) Select TCP/IP in Local Network Properties.

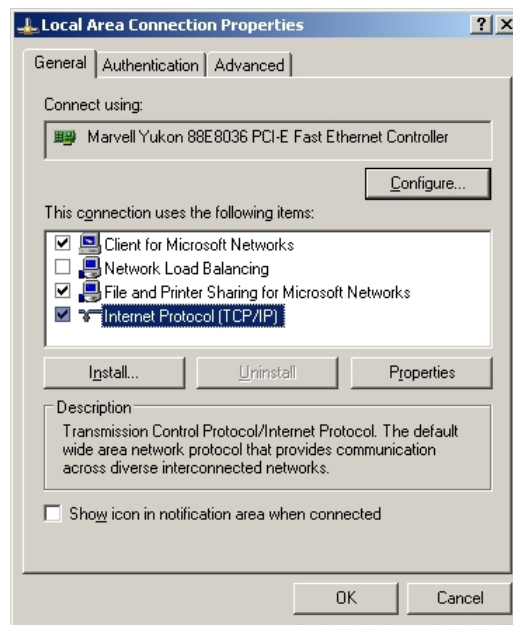


Figure 5.2.7a. Local Area Connection Properties

- 3) IP Setting
Under Internet Protocol (TCP/IP) properties, select "Obtain an IP address automatically." Or, you can select "Use the following IP address", and input 192.168.2.XXX , for which the recommended IP address is 192.168.2.200.

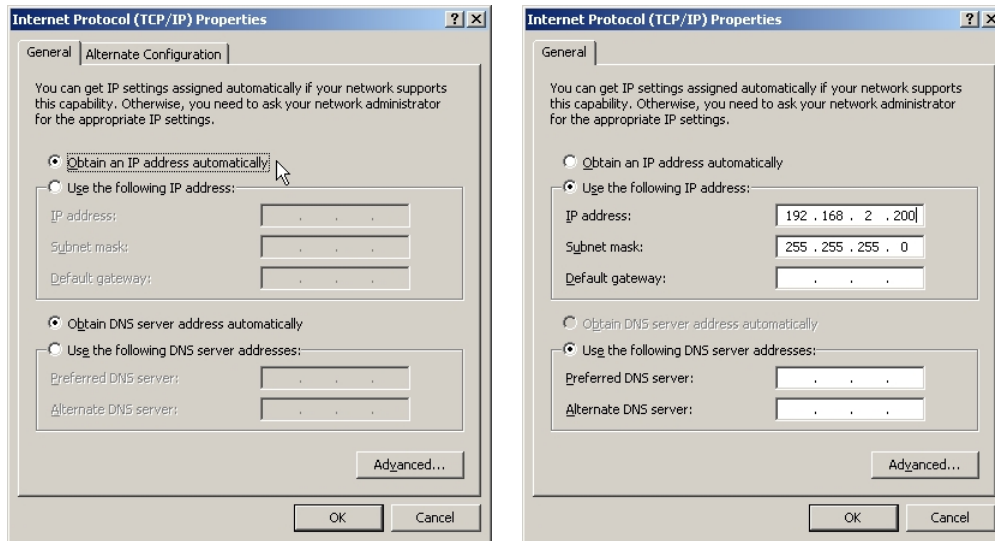
Assign the IP address as follows:

IP address: 192.168.2.200

Subnet mask: 255.255.255.0

Default gateway: Leave it blank

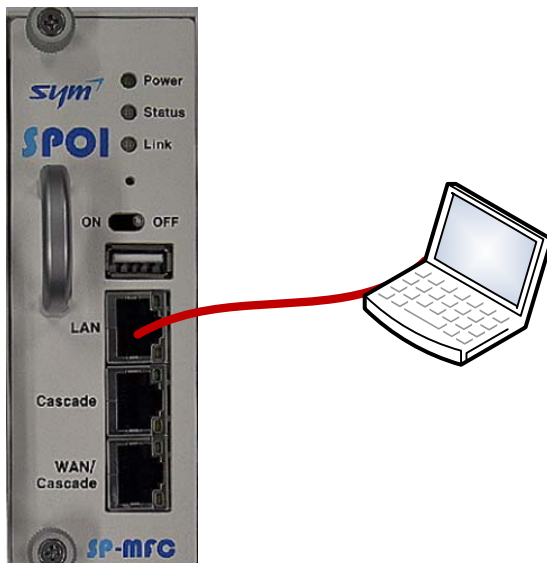
- 4) Open Internet Explorer and type in <http://192.168.2.1>
- 5) Once the login screen appears, login to the Active SPOI.



Automatic (Dynamic) IP assignment

Manual (Static) IP assignment

Figure 5.2.7b. Internet Protocol (TCP/IP) Properties



Connect the laptop to the LAN port on the Controller card

Laptop LAN Setting:

1. Obtain an IP address automatically

Or

2. Use the following IP address

IP: 192.168.2.200

Subnet Mask: 255.255.255.0

Gateway: Leave it blank

Active SPOI Login Address

[Http://192.168.2.1](http://192.168.2.1)

ID: admin

PW: spo

Figure 5.2.7c. LAN Connectivity Diagram

6. WEB GUI

For security purposes, only authorized users can log into the Web GUI.

Local (LAN) Web GUI Login:

- 1) Connect the laptop or PC to the LAN port of the Active SPOI.
- 2) Open a web browser.
 - Recommended browsers include: Internet Explorer, Google Chrome, or Firefox
- 3) Type in the IP address for the Active SPOI unit: http://192.168.2.1

Note !

For remote access, there is no need to connect the PC to the Active SPOI.
For remote (WAN) access, type in the WAN IP address which was assigned to the Active SPOI.

- 4) Enter the User ID and Password assigned by the administrator. The default accounts and access levels are listed below:

Control Level:	Access:	User ID:	Password:
Administrator	Full Access	admin	spoi
Moderate	Read/Write	user	control
Minimum	Read Only	guest	monitor

Note: Only the Administrator can utilize the account setup

- 5) Click Login button.



Figure 6a. Login Screen

GUI Layered Access Rights:

There are three types of access rights listed in the left column. Each access right allows for viewing the tab and/or viewing and setting values on the tab. See the table below.

TYPES OF ACCESS	Status & Config.	Setup	Alarm History	Statistics
Read	View	View	View	View
Read/Write*	View/Set	View/Set	View/Set	View/Set
Administrative	View/Set	View/Set	View/Set	View/Set

*Note: Read/Write user can utilize Active SPOI functions like the administrator with the exception of the account setup.

Table 6a. GUI Access Rights

Tabs:

The Active SPOI has 4 main menu tabs as shown in the figure below: Status & Configuration, Setup, Alarm History, and Statistics. The “Account” sub-tab on the Setup tab will only be visible to the administrator. All other menus are visible to read/write user. Each menu can be accessed by clicking directly on to the tab.

Login name will be displayed in the upper right corner.

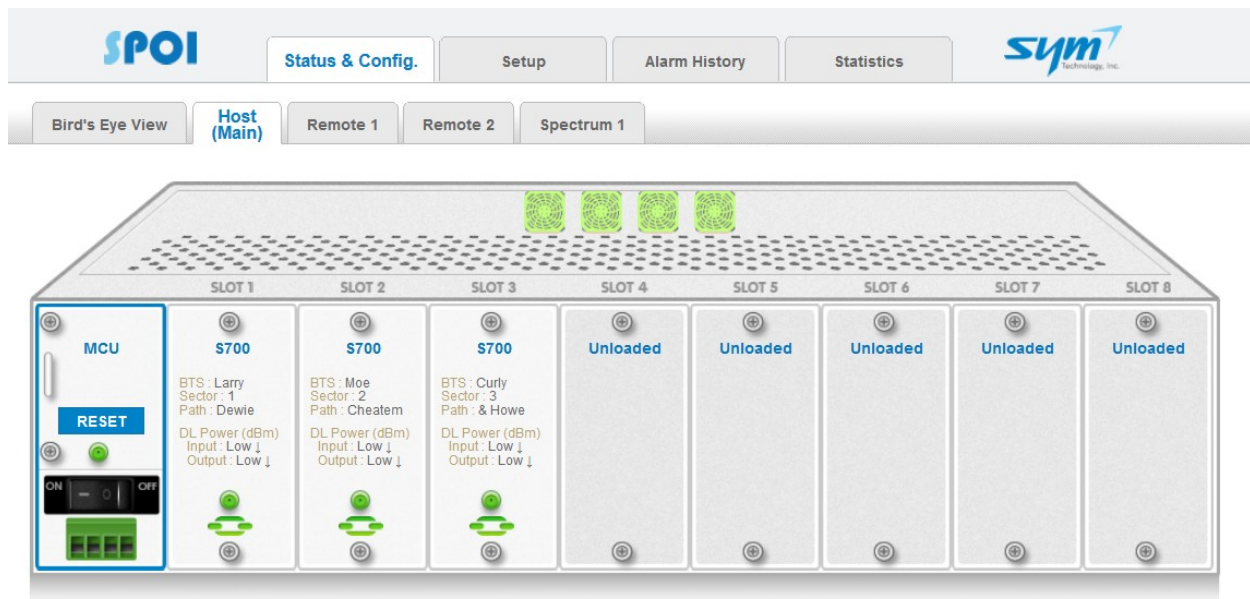
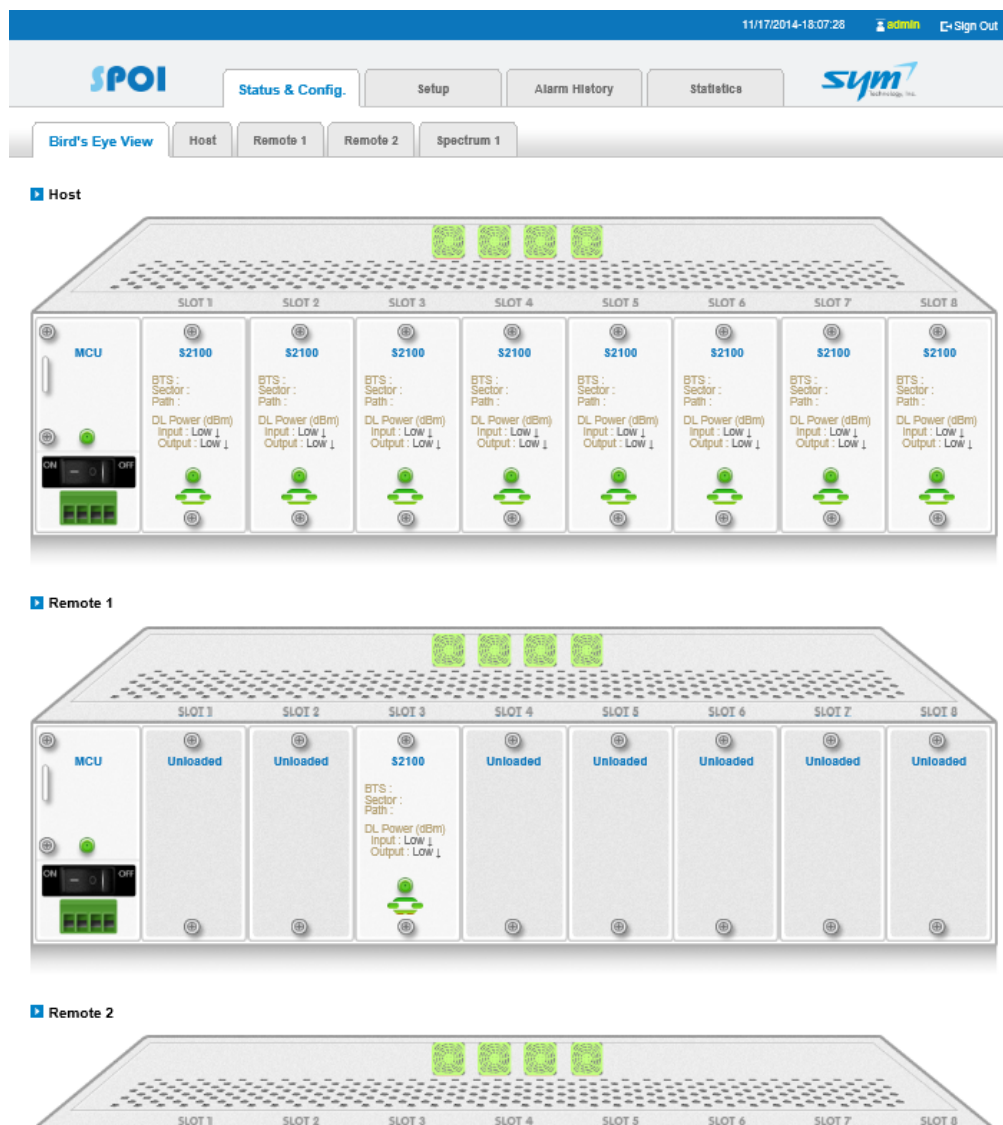


Figure 6b. Menu Tabs

6.1. STATUS & CONFIGURATION TAB

The Status and Configuration tab is all that is needed to operate the unit once it is properly configured and is the first display upon successful login. From this page, a virtual display of all the configured units are represented in a "Bird's Eye View." The front side of all units and all active RF line cards are displayed as well as the cooling fans. From this single connection, both the Host unit and all of the Remote units can be accessed by either selecting the desired unit from the subtabs or simply clicking on the desired unit/RF line card giving the user full system control with a single connection. The fans and the RF line card status and link icons are color coded as follows:

- Grey: Inactive (Not Connected)
- Green: Active and Good
- Red: Active Alarm



6.1.1. Master Controller Unit

The Active SPOI is configured as the Host or a Remote Unit by selecting the appropriate mode on the Master Controller Unit (MCU). By selecting the MCU, the Node Information is displayed where the user can select the Host/Remote selection and enter in the unit ID (Cascade Code). This should be done individually prior to Daisy-chaining the Host/Remote units together.

Node Information

Daisy Chain Mode : Host SET

ID (Cascade Code) : Host SET

Serial Number :

SW Version :

Operating Time : 39 Seconds

System Log :

Registered Device List

No.	Type	Node No.	IP Address	Delete
1	SPOI	Host	192.168.169.15	-
2	SPOI	Remote 1	192.168.169.1	-
3	SPOI	Remote 2	192.168.169.2	-
4	iSpectrum	Spectrum 1	192.168.169.16	-

Device List

No.	Type	Node No.	IP Address	Activation
<input checked="" type="checkbox"/> Auto Registration				

Figure 6.1.1 MCU Settings for Host/Remote

6.1.2. Slot Card Settings

Once a unit/RF line card is selected, an innovative visual block diagram with user configurable settings is displayed which provides a very intuitive process to maintain the power levels. The Power levels and total insertion loss values are automatically measured and calculated as changes are being made.

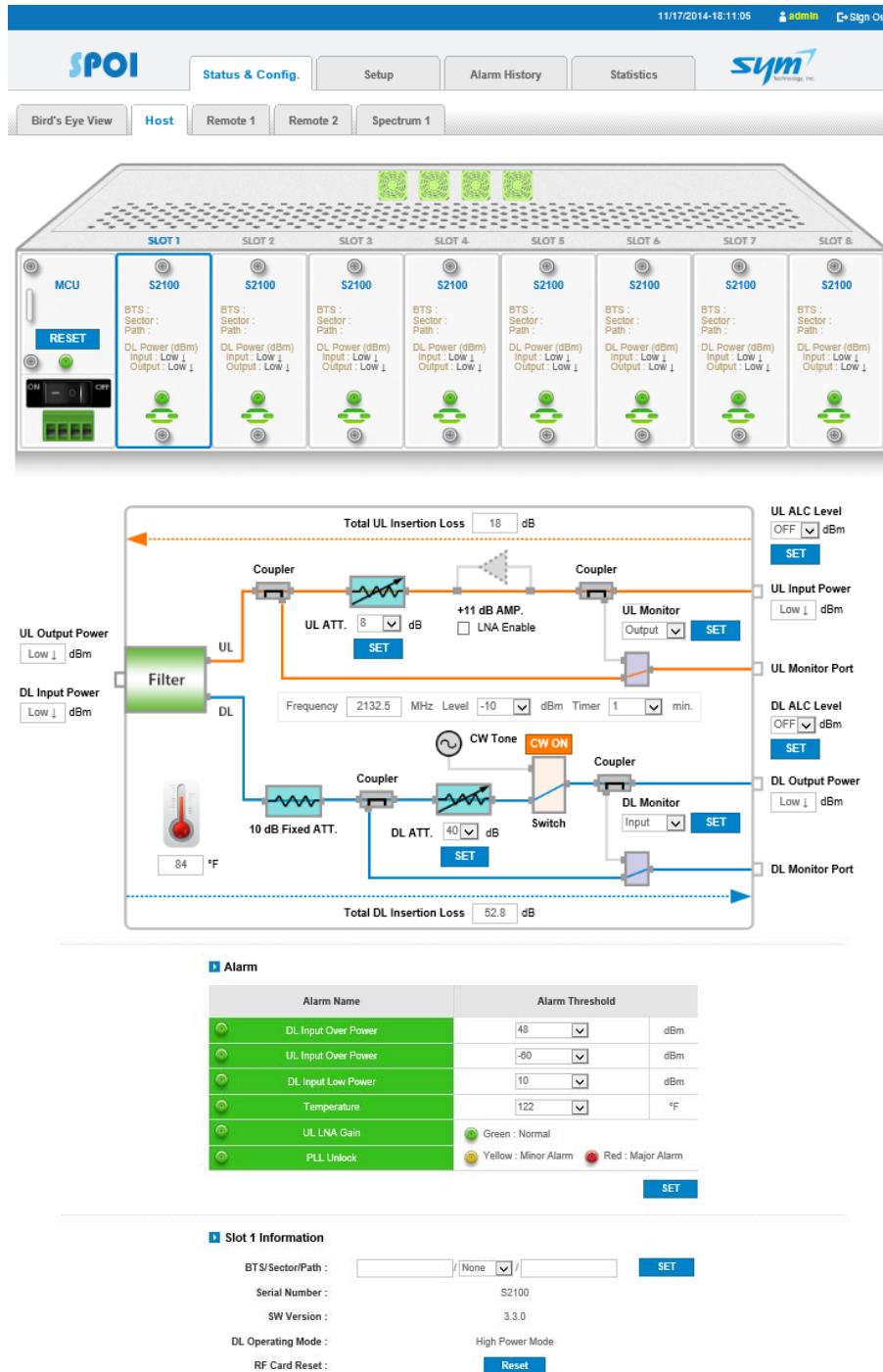


Figure 6.1.2 Active SPOI Slot Card Settings Diagram

6.1.3. Active SPOI Block Diagram

The Block diagram contains all the information needed to manage the power levels. The graphic below identifies all of the features of this visual display:

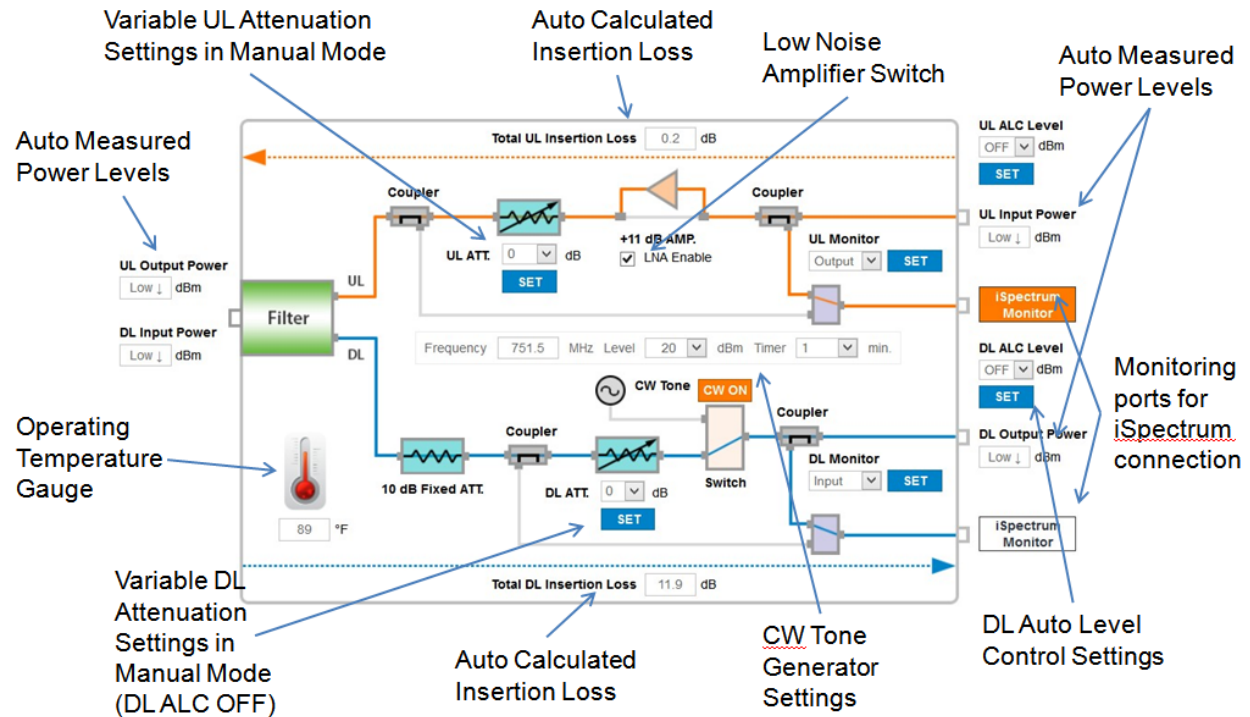


Figure 6.1.3 Active SPOI Block Diagram

6.1.4. Active SPOI Manual Operation

To operate the Active SPOI in Manual Operation Mode, the steps are very straight forward:

1. Select UpLink (UL) Attenuation Value
2. Select DownLink (DL) Attenuation Value
3. Enable the Low Noise Amplifier if necessary

Monitor the Power Level and Insertion Loss measurements to ensure correct settings

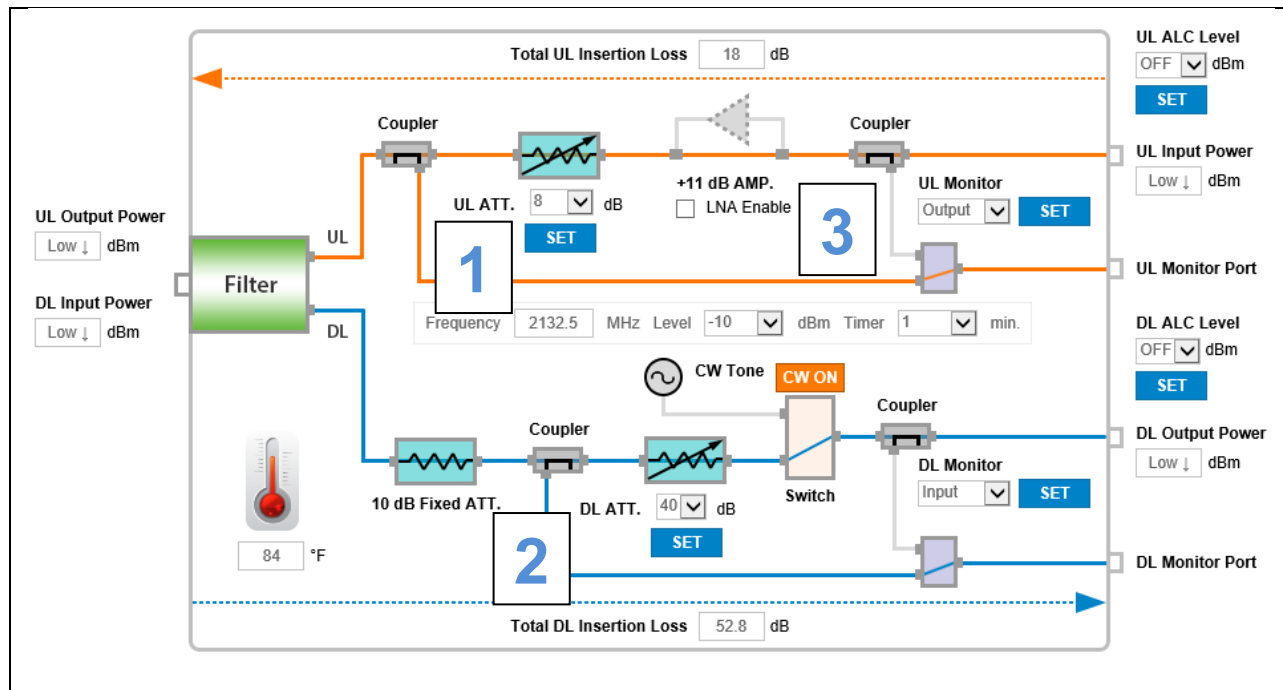


Figure 6.1.4 Active SPOI Block Diagram: Manual Mode

6.1.5. Active SPOI Auto Level Control Operation

To operate the Active SPOI in Auto Mode, the steps are very straight forward:

1. Select the UpLink or DownLink Auto Level Control Value and click “set” to enable ALC
2. Enable the Low Noise Amplifier if necessary

Monitor the Power Level and Insertion Loss measurements to ensure correct settings. The unit will automatically maintain the desired downlink power level and automatically adjust the DL attenuation as necessary.

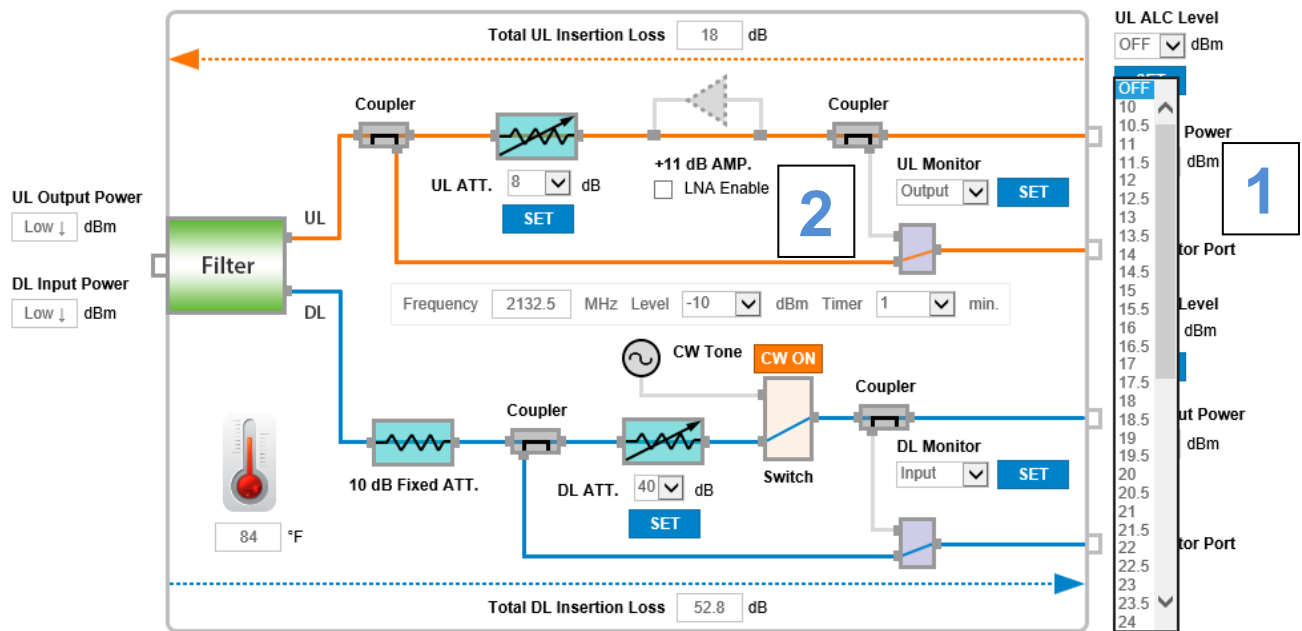


Figure 6.1.5 Active SPOI Block Diagram: Auto Level Control Mode

6.1.6. Active SPOI High Power & Low Power Differences

When the Active SPOI is connected to the High Power mode via a jumper cable, a 10dB internal fixed attenuator is activated. The block diagrams below depict the differences between the two modes of operation:

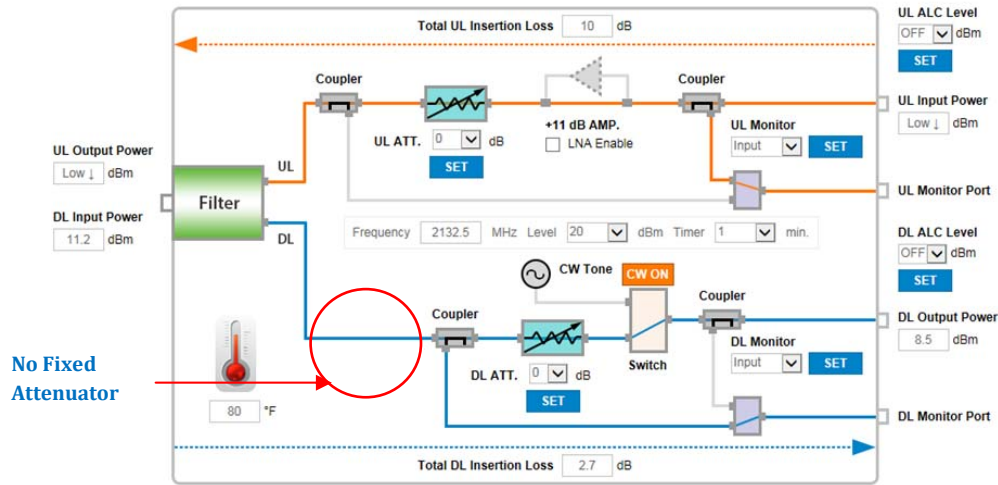


Figure 6.1.4a Active SPOI Block Diagram: Low Power Mode

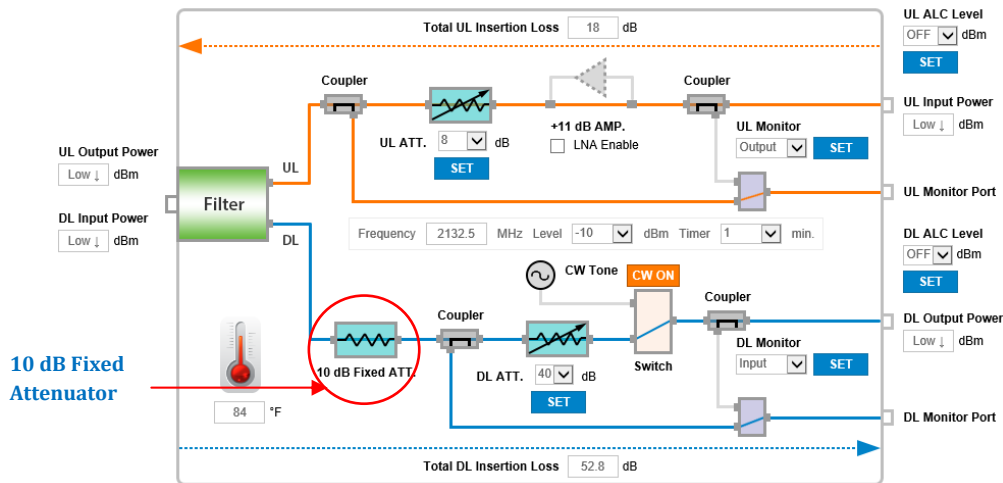


Figure 6.1.6 Active SPOI Block Diagram: High Power Mode

6.1.7. CW Tone Generation

The integrated CW tone generation feature is a powerful tool that streamlines CW test procedures and significantly reduces DAS commissioning time as well as optimization and troubleshooting processes. The CW tone is injected in the Tx path and is activated by selecting the desired values for the frequency, level, and the duration. The CW Tone is controlled by a timer that automatically turns the CW tone off after the desired time to prevent unintended continual tone generation. Once the timer cycle is complete, the unit will resume normal operation automatically.

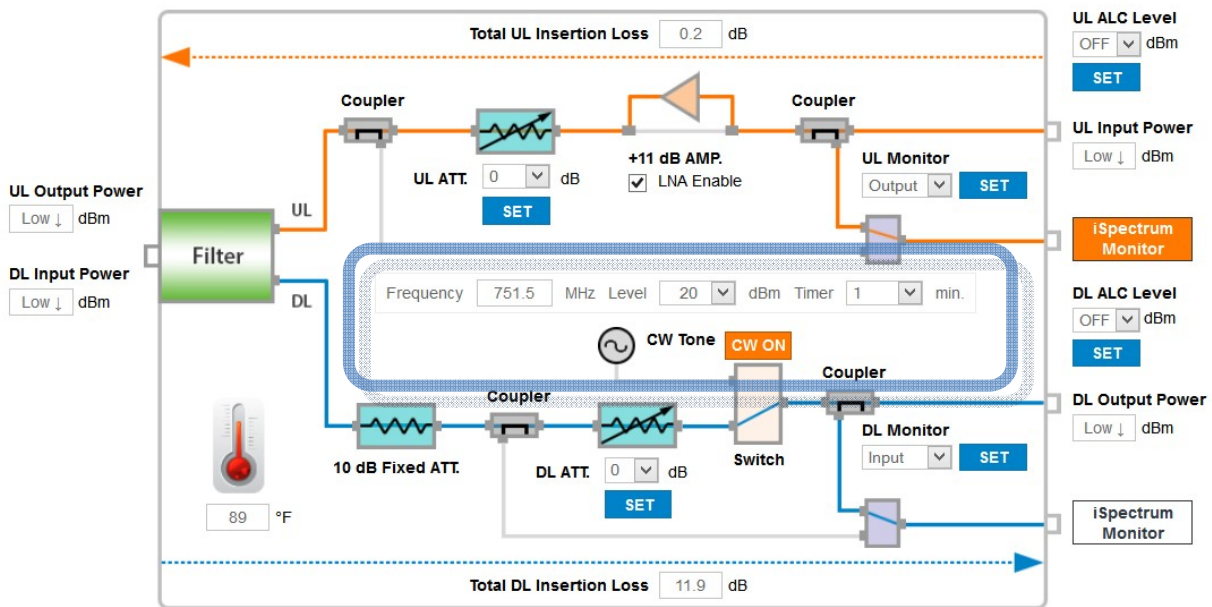


Figure 6.1.7 CW Tone Generator Function

6.1.8. iSpectrum Integration

The iSpectrum integration allows an extremely useful system to be able to control the DAS environment by simultaneously controlling the power levels and seeing the live spectrum view through the integrated iSpectrum units allowing the user total control and visibility in a single location. The iSpectrum is first registered by the Host unit's MCU. Once the iSpectrum(s) are registered, they will be displayed on the sub menu bar after the last Remote Unit.

Node Information

Daisy Chain Mode :

ID (Cascade Code) :

Serial Number : SPMFC01001

SW Version : 1.0.1

Operating Time : 0 Day 19 Hours 42 Minutes 46 Seconds

System Log :

Registered Device List

No.	Type	Node No.	IP Address	Delete
1	SPOI	Host	192.168.169.15	-
2	SPOI	Remote 1	192.168.169.1	-
3	SPOI	Remote 2	192.168.169.2	-
4	iSpectrum	Spectrum 1	192.168.169.16	-

Unregistered Device List

No.	Type	Node No.	IP Address	Activation
<input checked="" type="checkbox"/> Auto Registration				

Figure 6.1.8a iSpectrum Integration

Under the iSpectrum tab, each port will need to be mapped to the Active SPOI node, slot, and path. This will allow the user to click on the "iSpectrum Monitor" button in the block diagram and display the live spectrum for the selected Active SPOI port. To map an iSpectrum port:

1. Register the iSpectrum from the Host/MCU menu
2. Select the iSpectrum tab to map
3. Activate the iSpectrum port
4. Select the Active SPOI the iSpectrum is connected to (Node)
5. Select the Active SPOI Slot number the iSpectrum port is connected to (Slot No.)
6. Select the path the iSpectrum is connected to, either UpLink (UL) or DownLink (DL)
7. Click the "set" button to save the settings

iSpectrum RF Ports Mapping (Spectrum ID :)

Port	<input checked="" type="checkbox"/>	Node No.	Slot No.	Path
1	<input checked="" type="checkbox"/>	Host	1	DL
2	<input checked="" type="checkbox"/>	Host	1	UL
3	<input checked="" type="checkbox"/>	Host	2	DL
4	<input checked="" type="checkbox"/>	Host	2	UL
5	<input checked="" type="checkbox"/>	Remote 1	3	DL
6	<input checked="" type="checkbox"/>	Remote 1	3	UL
7	<input type="checkbox"/>	Host	1	DL
8	<input type="checkbox"/>	Host	1	DL
9	<input type="checkbox"/>	Host	1	DL
10	<input type="checkbox"/>	Host	1	DL
11	<input type="checkbox"/>	Host	1	DL
12	<input type="checkbox"/>	Host	1	DL
13	<input type="checkbox"/>	Host	1	DL
14	<input type="checkbox"/>	Host	1	DL
15	<input type="checkbox"/>	Host	1	DL
16	<input type="checkbox"/>	Host	1	DL
17	<input type="checkbox"/>	Host	1	DL
18	<input type="checkbox"/>	Host	1	DL
19	<input type="checkbox"/>	Host	1	DL
20	<input type="checkbox"/>	Host	1	DL
21	<input type="checkbox"/>	Host	1	DL
22	<input type="checkbox"/>	Host	1	DL
23	<input type="checkbox"/>	Host	1	DL
24	<input type="checkbox"/>	Host	1	DL

SET

Figure 6.1.8b iSpectrum Port Mapping

Once the iSpectrum port mapping is complete, the user can now view the live spectrum by selecting the Unit/Slot to monitor. The GUI also has a very unique feature, the ability to switch the monitoring port to either an input or output port.

This feature is clearly depicted in the GUI and is user selected by the drop down menu for both the Uplink (RX) and Downlink (TX) monitoring ports. This allows spectrum monitoring either pre or post attenuation on either path which is an extremely valuable tool to provide maximum functionality.

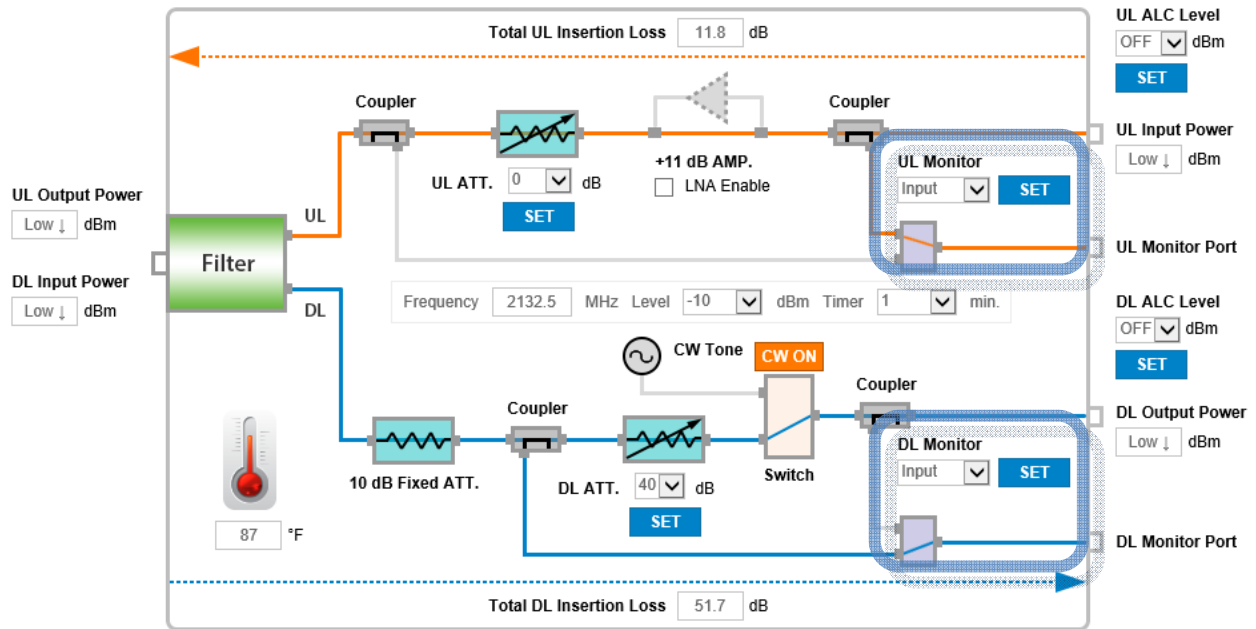
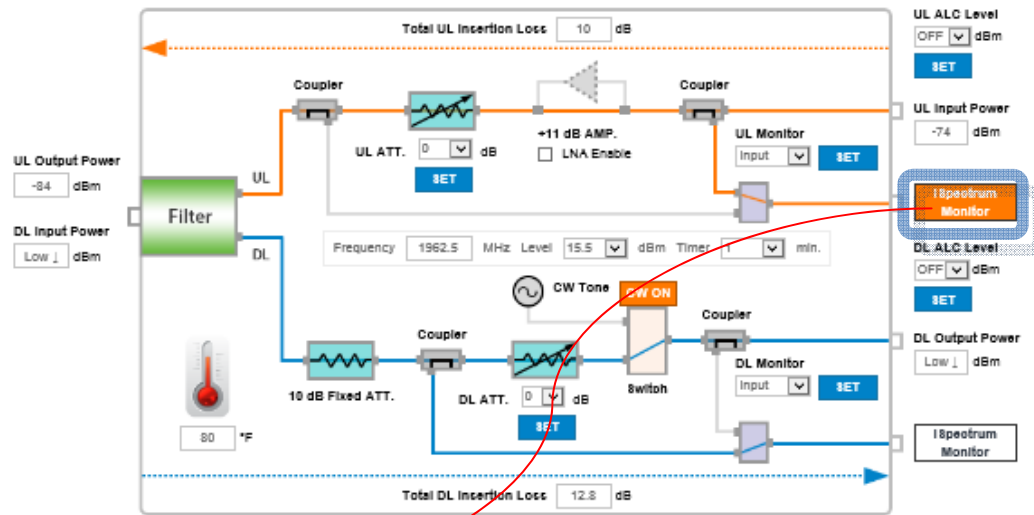


Figure 6.1.8c iSpectrum Input/Output Settings



iSpectrum Monitor

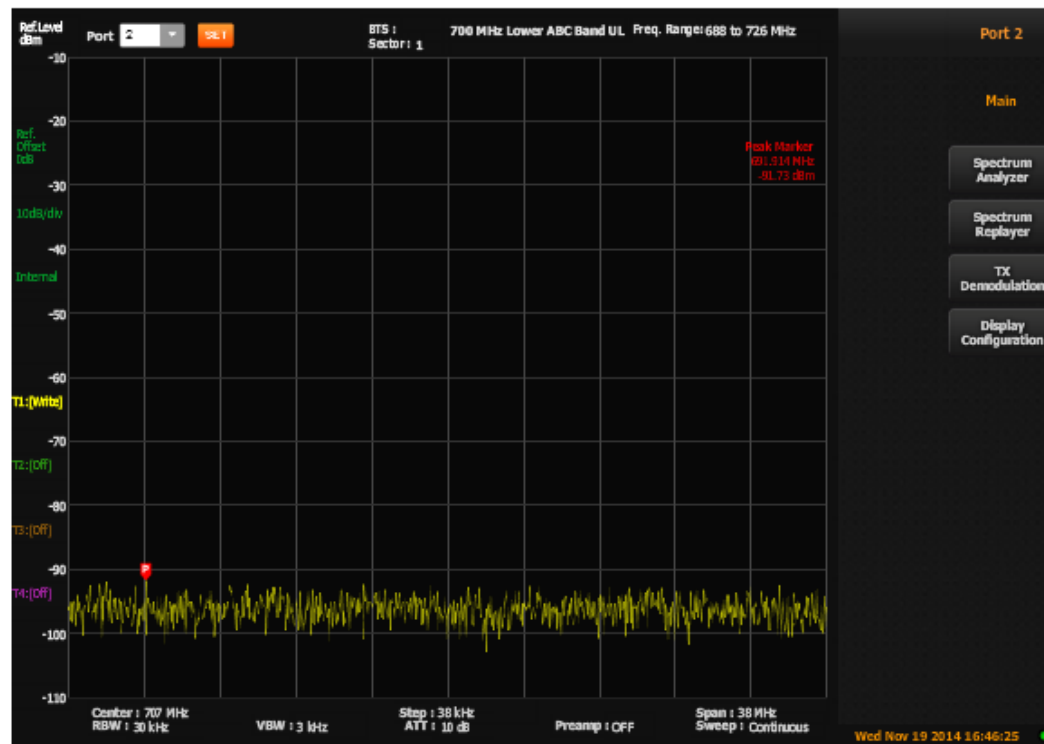


Figure 6.1.8d iSpectrum Live Monitoring

6.1.9. Alarm Settings

The alarm settings are also located in this view at the bottom of this page. The operation of the alarms is also very intuitive.

1. Set alarm threshold values for each of the settings on the card GUI
2. Ensure proper SNMP or SMTP settings have been configured for alarm delivery under the Setup>Notification Tab

Alarm

Alarm Name	Alarm Threshold	
DL Input Over Power	48	dBm
UL Input Over Power	-60	dBm
DL Input Low Power	10	dBm
Temperature	122	°F
UL LNA Gain	Green : Normal	
PLL Unlock	Yellow : Minor Alarm Red : Major Alarm	

SET

Figure 6.1.9a Alarm Settings

6.1.10. Safe Mode - Power Loss Bypass Functionality

In the event of a power failure, the Active SPOI automatically bypasses to the safe mode to ensure continuous service. The downlink Tx path will retain a constant path loss. The uplink Rx path will default to a 7.5 dB insertion loss and will resume to user selected attenuation when power is restored.

6.2. SETUP TAB

The Setup Tab contains all the information to configure the Active SPOI for operation. There are six subtabs to easily guide the configuration process to set up local and remote access, alarming destination, Active SPOI unit settings, user account settings, and software update settings.

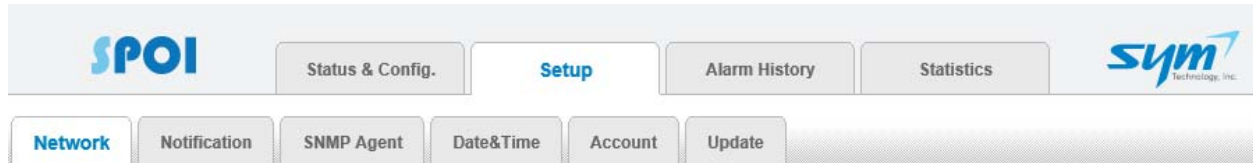


Figure 6.2a Setup Tab

6.2.1. Setup > Network Tab

The WAN Ethernet Configuration will be connected to wired LAN or wireless modem for remote access. If a DHCP server is connected to the WAN port, it should be set at “Obtain an IP Address Automatically”, since this port works as the DHCP client mode. In other words, once a DHCP server is connected to the WAN port, the Active SPOI will be assigned with an IP address automatically from the DHCP server. The assigned IP address should be identified to see if the user can access the Active SPOI remotely.

However, it is highly recommended that users use a public (static or fixed) IP address rather than “Obtain an IP Address Automatically (IPv4)” as shown below example.

▶ Wide Area Network (WAN-Cascade)

☐ Obtain an IP Address Automatically (IPv4)

IP Address	68	-	225	-	17	-	90
Subnet Mask	255	-	255	-	255	-	240
Default Gateway	68	-	225	-	17	-	100
Preferred DNS Server	8	-	8	-	8	-	8
Alternate DNS Server	8	-	8	-	4	-	4

▶ Local Area Network (LAN)

☐ Obtain an IP Address Automatically (IPv4)

IP Address	192	-	168	-	2	-	1
Subnet Mask	255	-	255	-	255	-	0
Default Gateway		-		-		-	

Figure 6.2.1a Ethernet Configuration (LAN/WAN Port)

If there is no valid wired internet connection, a wireless modem (ex. SYM's LTE Modem UWMS-05) can be connected to the Active SPOI. By configuring the port-forwarding table on the wireless modem, users will be able to access the Active SPOI remotely using the modem's mobile IP address and port forwarding number.

The LAN port IP address cannot be changed. When the user accesses it locally, this port can be always used. The IP address is set to: 192.168.2.1. Please refer to section 5.2.7 for more detail.

6.2.2. Setup > Notification

The Notification features of the Active SPOI allow for both alarms and notifications to be sent via SNMP or email through an SMTP mail server. At the completion of each section, the set button should be clicked to save these settings.

6.2.2.1. Heartbeat

The first sub-tab is for site identification and heartbeat intervals as well as geographical Latitude and Longitude coordinates to be set. This is essential for accurate alarm notifications and history. The Site ID should be labeled, and the rate for receiving the SNMP heartbeat notification of the Active SPOI's status can be selected from 1 to 60 minutes by using the drop down menu. The location section requires the latitude and longitude of the location since it is included in the SNMP heartbeat (Trap) and alarm (Inform).

MIB Selection: Select the Standard MIB for use with Site Portal or select Custom MIB and the correct MIB Manager IP address for functionality with other systems. If you are not sure which one to use, please contact support.

The screenshot displays the 'Notification' setup page for an Active SPOI. The 'Heartbeat' sub-tab is active. It features a 'MIB Selection' section with 'Standard MIB' selected. The 'Heartbeat Interval' is set to 20 minutes. The 'Location' section contains latitude and longitude coordinates: Latitude is N 001 100000 and Longitude is W 001 100000. A 'SET' button is located at the bottom right of the form.

Figure 6.2.2.1a Heartbeat and MIB Selection

6.2.2.2. SNMP Trap & Inform

An SNMP Destination IP address must be entered for alarm notification. When custom MIB is selected, this setting won't be available since custom MIB can support only heartbeat.

The Active SPOI supports both SNMP V2C and V3 versions.

Network

Notification

SNMP Agent

Date&Time

Account

Update

Heartbeat

SNMP Trap & Inform

E-mail & SMTP

▶ SNMP Trap & Inform Setup

Destination Address

SNMP Port

SNMP Version ▼

Community :

SET

▶ SNMP Alarm Destination List

No	Destination Address	SNMP Port	SNMP Version	Delete
----	---------------------	-----------	--------------	--------

Figure 6.2.2.2a SNMP Trap & Inform Settings

6.2.2.3. E-Mail & SMTP

Enter the SMTP Server information to receive alarm notifications via E-mail. If you are not sure of your email SMTP server settings, please contact your IT department for correct settings.

Enter in the email address of recipients and their user name and click the set button to be added to the E-mail Recipient List. The users in the recipient list will automatically receive email notifications when alarms are generated.

Network

Notification

SNMP Agent

Date&Time

Account

Update

Heartbeat

SNMP Trap & Inform

E-mail & SMTP

▶ E-mail Registration

E-mail Address

User Name

SET

▶ E-mail Recipient List

No.	E-mail Address	User Name	Delete
-----	----------------	-----------	--------

▶ SMTP Server

E-Mail Address

Server Name

Server Port

Over SSL

SSL Disable

Server Requires Authentication

Authentication Disable

User Name

Password

SET

Figure 6.2.2.3a E-Mail & SMTP Settings

6.2.3. Setup > SNMP Agent

The SNMP Agent tab contains the settings for the SNMP V2C and V3 settings and must be completed in order for traps to be successfully sent. Once all the settings are completed, the set button must be clicked to save the settings.

The screenshot displays the 'SNMP Agent' configuration page. At the top, there is a navigation bar with tabs: 'Network', 'Notification', 'SNMP Agent' (which is highlighted in blue), 'Date&Time', 'Account', and 'Update'. Below the tabs, the 'SNMP V2C Configuration' section is expanded, showing 'Read Community' set to 'public' and 'Write Community' set to 'private'. Below this, the 'SNMP V3 Configuration' section is also expanded, showing fields for 'User Name' (spoi), 'Security Level' (Use All), 'Auth. Algorithm' (MD5), 'Auth. Password' (authpasscode), 'Privacy Algorithm' (AES), and 'Privacy Password' (privpasscode). A blue 'SET' button is located at the bottom right of the form.

Configuration Section	Field	Value
SNMP V2C Configuration	Read Community	public
	Write Community	private
SNMP V3 Configuration	User Name	spoi
	Security Level	Use All
	Auth. Algorithm	MD5
	Auth. Password	authpasscode
	Privacy Algorithm	AES
	Privacy Password	privpasscode

Figure 6.2.3a SNMP Agent Settings

6.2.4. Setup > Date&Time

The Date and Time can be synchronized by multiple external sources by selecting the desired source in the drop down selection. The Time Zone should be selected based on the local time zone where the Active SPOI is installed for accuracy.

Network Notification SNMP Agent **Date & Time** Account Update

Time Setting

NTP Server : Direct Input 65.55.56.206

This SPOI is set to automatically synchronize on a scheduled basis.

Time Zone

(UTC-08:00) Pacific Time (US and Canada)

☐ Automatically adjust clock for Daylight Savings Time

SET

Figure 6.2.4a Date & Time Settings

6.2.5. Setup > Account

Only the Administrator can access the Account Tab. Read only and Read/Write members won't see this tab. The Account Tab includes the New Account function and the Account List that displays current accounts and accessibility.

The Account List will show all users and enables the Administrator to add and delete accounts. The New Account sub tab enables the Administrator to designate new accounts and security access.

Account information will be retained even when the Active SPOI is rebooted.

There is a factory reset set hole next to the Ethernet port in the rear side. Once the user pushes and holds it for 5 seconds, all settings will be reset to the factory setting. This means that all band configurations, setup information, including account settings, will be erased and will need to be reconfigured from a backup file.

Multiple accesses are possible for up to 10 (recommended) simultaneous users.

The screenshot displays the 'Account' tab in the setup menu. It features a 'New Account' section with input fields for 'New User Name' (containing 'admin'), 'Password' (masked with dots), 'Accessibility' (a dropdown menu showing '+ Select'), and 'Confirm Password'. A 'SET' button is located to the right of the 'Confirm Password' field. Below this is the 'Account List' section, which contains a table with the following data:

No	User Name	Accessibility	Delete
1	admin	Administrator	-
2	user	Read/Write	<button>Delete</button>
3	guest	Read Only	<button>Delete</button>

Figure 6.2.5a Account Settings

6.2.6. Setup > Update

- **Software Updates:** If necessary, new software can be installed by selecting it through the Browse button and clicking the Update button. The Software packages include updates for all controllers and line cards. Click the update button to load the new software and automatically reboot the system.
- **Software Synchronization:** Once the Software is loaded, all controllers and line cards installed in the chassis (Host mode only) or network (in Daisy Chain mode) can be synchronized with a single click on the Sync button.

Network
Notification
SNMP Agent
Date&Time
Account
Update

Software Update

Click "Browse" to locate new software and click "Update" to upload the selected software.

File Name : Browse

Update

Software Synchronization

Click "Sync" to synchronize the software version of the connected nodes with the software of the host.

Sync.

Node	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
Host V1.0.1	V3.1.0	V3.1.0	V3.1.0	Blank	Blank	Blank	Blank	Blank
Remote 1 V1.0.1	Blank	Blank	Blank	Blank	Blank	Blank	Blank	Blank
Remote 2 V1.0.1	Blank	Blank	Blank	Blank	Blank	Blank	Blank	Blank

Figure 6.2.6a Update Settings

6.3. ALARM HISTORY TAB

The Active SPOI stores both performance and operational alarms. The Host unit stores all alarms generated on all the remote units. All alarms can be sent via SNMP and/or email and are covered in more detail in the Setup Section.

Alarm ID	Node ID	Slot ID	Alarm Name	Event Time	Cleared Time	Delete
141571654702004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:54:25	11/11/2014-05:55:05	<input type="checkbox"/>
141571644802004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:52:46	11/11/2014-05:53:24	<input type="checkbox"/>
141571627502004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:49:54	11/11/2014-05:50:37	<input type="checkbox"/>
141571623002004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:49:08	11/11/2014-05:49:15	<input type="checkbox"/>
141571613102004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:47:29	11/11/2014-05:48:25	<input type="checkbox"/>
141571602002004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:45:38	11/11/2014-05:46:01	<input type="checkbox"/>
141571594102004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:44:20	11/11/2014-05:44:48	<input type="checkbox"/>
141571568802004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:40:06	11/11/2014-05:40:43	<input type="checkbox"/>
141571560302004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:38:41	11/11/2014-05:39:04	<input type="checkbox"/>
141571556302004	Remote 2	-	Fan 4 Alarm	11/11/2014-05:38:01	11/11/2014-05:38:25	<input type="checkbox"/>

Figure 6.3a Alarm History Settings

The supported alarms are listed below:

- FAN Alarm
- Remote/Slot Link Fail
- PLL Unlock
- UL LNA Gain
- DL Input Over Power
- DL Input Low Power
- UL Input Over Power
- Temperature

6.4. STATISTICS TAB

The statistics tab graphically displays the power level history for both input and output power levels as well as alarm statistics. This feature is a powerful tool to analyze the usage statistics of the system to determine if any adjustments need to be made as well as trending for health status. The power levels are measured every hour and a full year of data is automatically stored for analysis and retrieval for the host and all remote units using the intuitive graphical interface to display the desired user selected data.



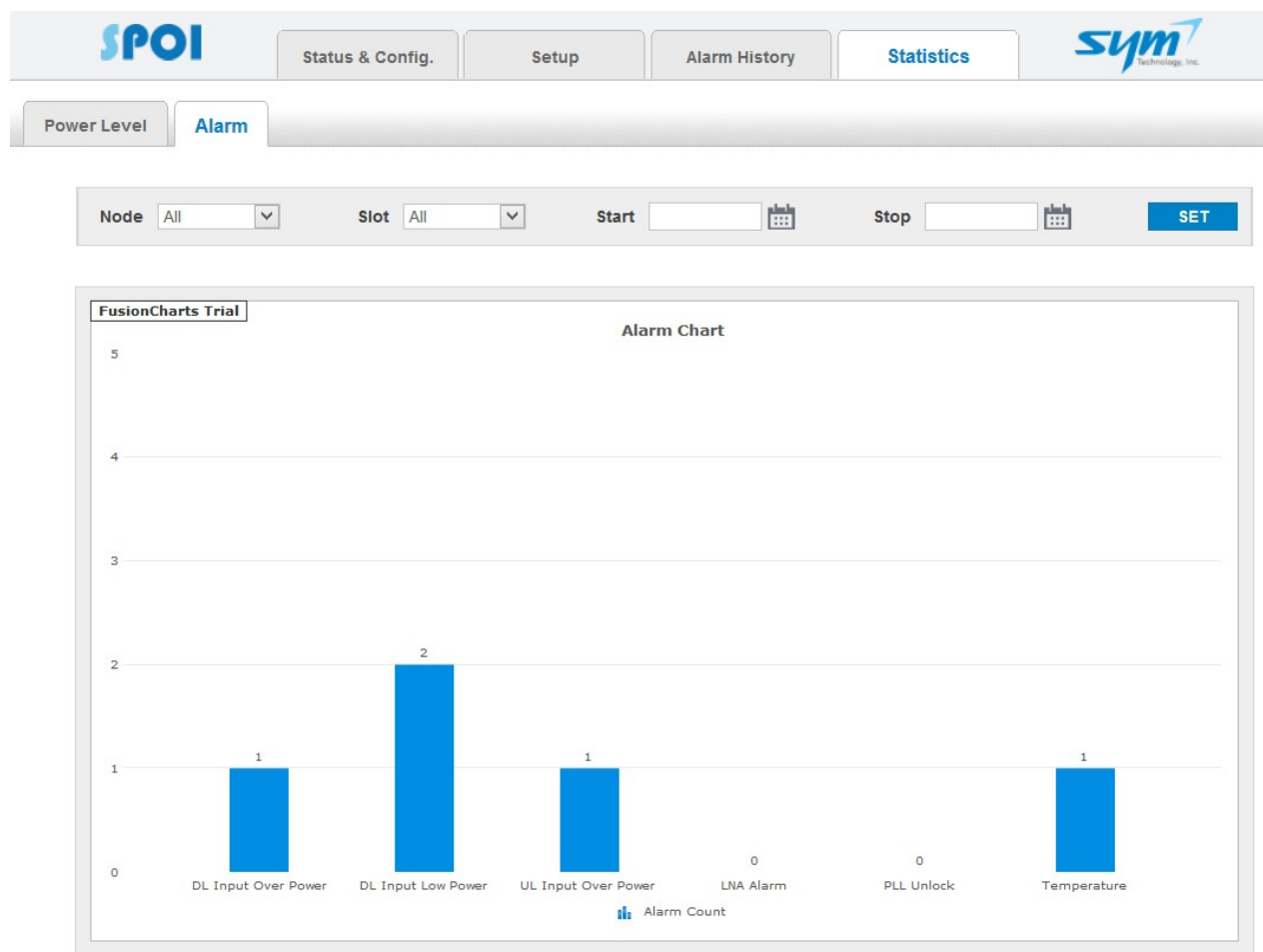


Figure 6.4 Statistics Graphs

7. SPECIFICATIONS

Item		TX (Downlink)		RX (Uplink)	Remark
		@High Power	@Low Power		
Max. Input Power		48 dBm (60 Watt)	38 dBm (6 Watt)	-10 dBm	Maximum
Insertion Loss @ DC Power ON	700	12.0 ± 0.5 dB	2.0 ± 1.0 dB	0 ± 1.0 dB @LNA ON 10.5 ± 1.0 dB @LNA OFF	@ 0 dB Attenuation
	850	12.0 ± 0.5 dB	2.0 ± 1.0 dB		
	1900	13.5 ± 0.5 dB	3.5 ± 1.0 dB		
	2100	13.5 ± 0.5 dB	3.5 ± 1.0 dB		
Insertion Loss @ DC Power OFF		I.L @ DC Power ON + DL ATT. Setting		7.5 ± 1.0 dB	
Attenuation Range		0 – 40 dB / 1 dB step		0 – 31 dB/ 0.5 dB Step	
Attenuation accuracy		1 dB		1 dB	
Ripple		2 dBp-p		2 dBp-p	Peak to peak
Coupling Value		41.0 ± 1.0 dB	31.0 ± 1.0 dB	8.0 ± 1.0 dB	
Return Loss		TX/RX : > 18 dB, TX OUT: > 15 dB		TX/RX: 18 dB, RX IN: > 18 dB	
TX/RX Isolation		> 80 dB			
PIM		> 153 dBc @43 dBm x 2			
BTS or eNB Connector		Mini-DIN (F) – TX/RX			Duplex Port
DAS Head-end Connector		QMA (F) – TX OUT & RX IN			Simplex Port
CW Tone	Level	-10 dBm to +20 dBm at the TX Output port			Level Accuracy : 1 dB
	Freq. Range	TX frequency range with 100 kHz Step @each assigned band			



Item	Specifications
Dimensions (W * H * D)	19" x 7" x 15.75" (483 x 177 x 400 mm)
Weight	Shelf : 16.5 lbs, RF Card: 6.6 lbs
Slot	1 Controller & 8 RF Cards
Cooling	FAN x 4 ea
Color	Light Gray (Panton 427C)
DC Power	-48VDC
Operating Temperature	+32 °F to +122 °F (0 °C to +50 °C)
Relative Humidity	5 % to 90 % Non-condensing
Ingress Protection rating	IP 20 minimum
Functionality	Safe Mode, Power Monitoring, Daisy Chain, CW Tone Generation, etc.
Alarming	SNMP V2C & V3, 7 Alarms
Interface between POI Controllers	Ethernet (RJ-45 jack)
Mounting Method	19" Rack Mount

Table 7. Active SPOI Specifications